

1

INTERACTION

Look and discuss...

Which senses are being used? How?

1



2



We use our ... to ...

... is being used to ...

3



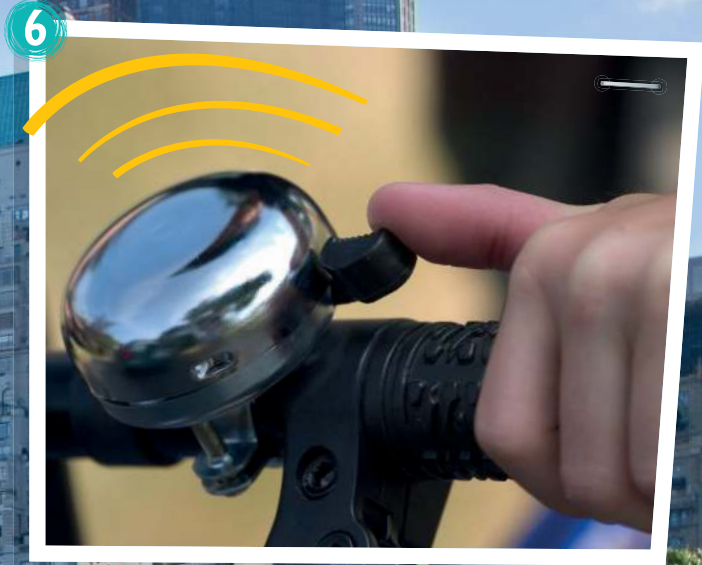
1 taste; 2 sight; 3 smell; 4 sight and hearing;
5 sight and touch; 6 hearing

4





Song
See, hear, touch, smell, taste



I'm Super Sensational Girl! I'll help you learn how we interact with our environment and how our nervous system works.



Can you think of ways our senses help us escape danger?

DOCUMENTARY
Sensing our world



- Invent a superhero and make a comic book about the nervous system. You will:
- learn how our bodies detect and respond to stimuli.
 - understand the pathways of the nervous system.
 - imagine life without one of your senses and develop empathy and respect for others.
 - create a visual and written comic book relating to a sense and a reaction.

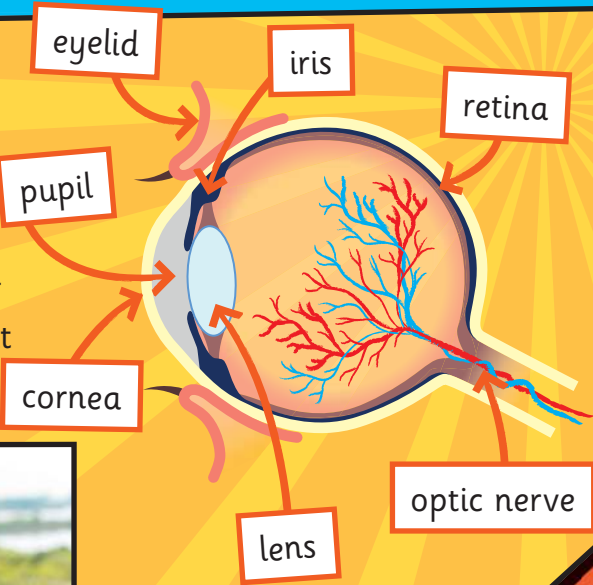
HOW DOES A COLD AFFECT YOUR SENSE OF TASTE?

Discover...
the organs and systems involved in interaction.

Interaction begins with our **sense organs**. These contain **receptors**, which are specialised cells that collect information, known as **stimuli**, from all around us. This information is then passed on to the **nervous system**.

SIGHT

Organ: eye
Receptors: in the retina
Stimulus: reflected light
Nerve: optic



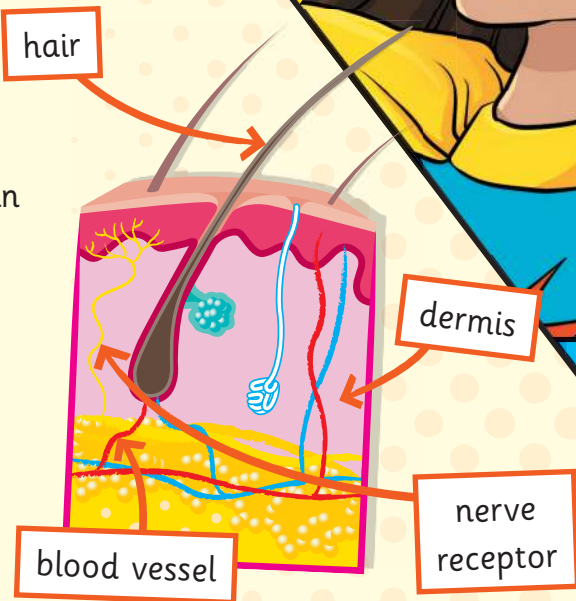
How does the eye work? Find some videos! Make a labelled model and write a description.

Humans have five main sense organs. Each one is sensitive to a different type of **stimulus**.



TOUCH

Organ: skin
Receptors: in the dermis
Stimulus: pressure, texture, heat, pain
Nerve: many sensory nerves in the peripheral nervous system



8



HEARING

Organ: ear
Receptors: in the cochlea
Stimulus: sound waves
Nerve: auditory

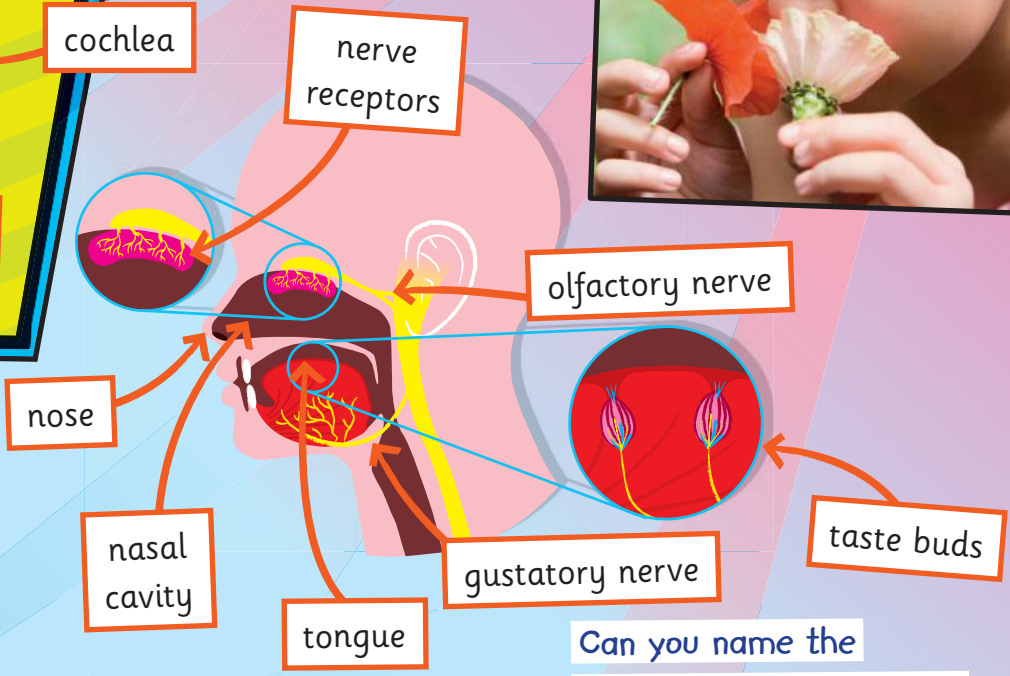


Investigate how sound waves reach the nervous system through the ear.



SMELL

Organ: nose
Receptors: cells inside nostrils
Stimulus: chemicals in the air
Nerve: olfactory



TASTE

Organ: tongue
Receptors: cells in taste buds
Stimulus: chemicals in food
Nerve: gustatory



Can you name the different types of taste?

A lot of what we taste comes from smelling our food. When our nose is blocked, the chemicals cannot reach the receptor cells in our nostrils which affects our sense of taste as well.

Design and carry out an experiment to test this!

Explore

STAGE 1

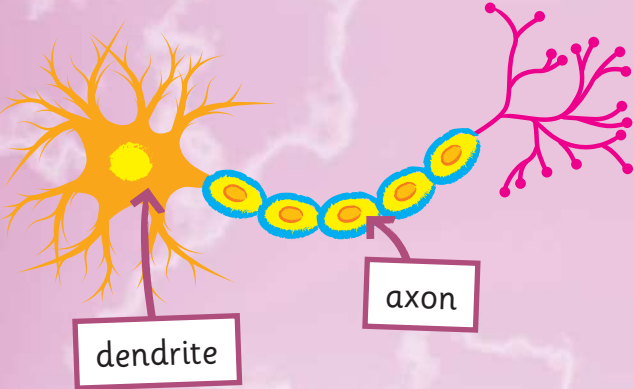
- Choose a stimulus for your superhero. For example, they see something dangerous or hear someone shouting from far away. This will be their *super sense*.
- Find out how humans detect this stimulus. What receptors and organs are used?
- Create the first scene for your comic book. Draw and write about the sense, receptors and organs involved.

DO PARTS OF OUR BRAIN CONTROL DIFFERENT THINGS?

Discover...
how the nervous system works.

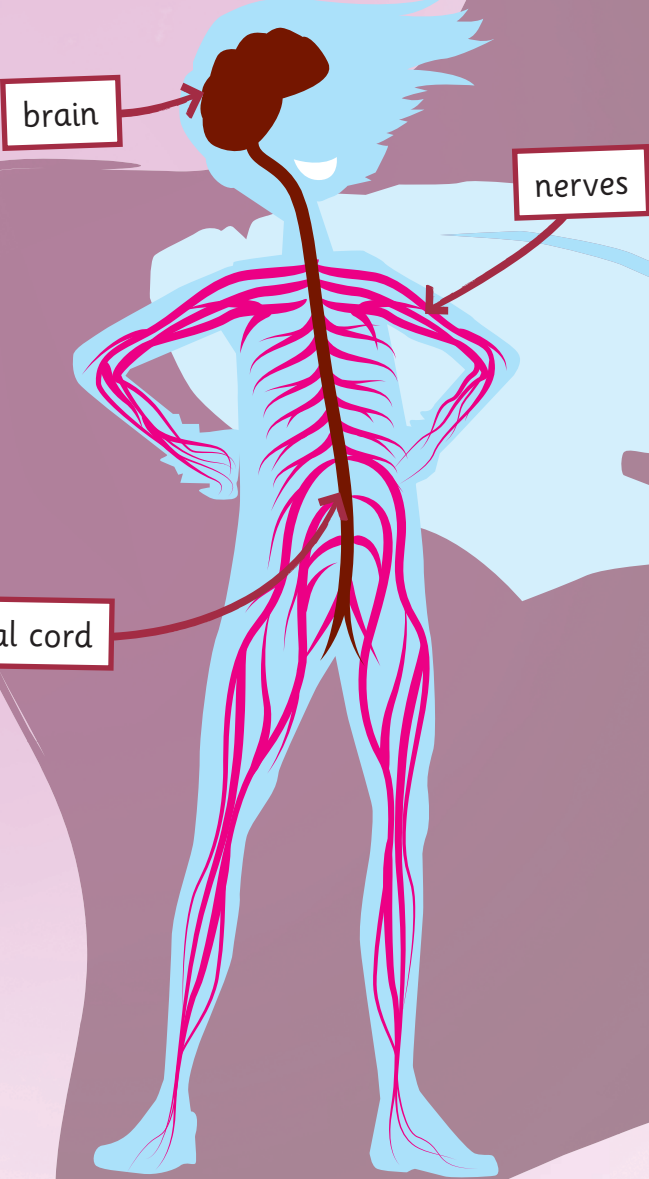
Our nervous system is our body's control centre. It interprets all the information we receive and tells our body what to do.

Like other systems, the nervous system is made up of cells, tissues and organs. The smallest part is a nerve cell, or **neuron**.



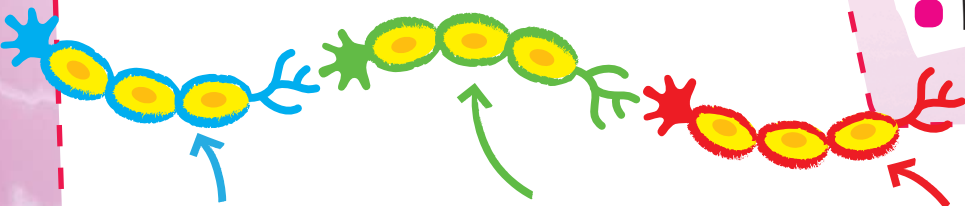
The **dendrites** in neurons are often the receptors from our sense organs. They transform a stimulus into an electrical signal, called an **impulse**. Once an impulse is started, it is sent along the **axons** of the neurons, through the body.

Nerve impulses can travel at speeds of 70 metres per second! Find out how and why.



Key:
● central nervous system
● peripheral nervous system

There are three main types of neuron within the nervous system:



sensory neurons: carry signals from receptors to the spinal cord and brain.

interneurons: carry signals between the different parts of the central nervous system.

motor neurons: carry signals from the central nervous system to effectors. *Where in the body can you find each type of neuron?*

The nervous system is divided into two parts: the **central nervous system** and the **peripheral nervous system**.

Look at the illustration.

What does each part include?

The **spinal cord** is nerve tissue that runs down our spine. It connects the nerves to our brain. It also controls reflexes.

The **brain** decodes the information from nerve impulses and decides if a response is needed. It coordinates a **response** with motor neurons.

Each part of the brain controls different processes.

cerebrum: thoughts, memory, feelings, decision-making, interpreting stimuli

brain stem: involuntary actions, sleeping

cerebellum: movement, balance, coordination

Find out more about what the brain controls and draw a brain map.

Find another brain hidden in the unit.



STAGE 2

- Think about your superhero's super sense. How does it reach the central nervous system?
- Create the next scenes for your comic book and include written descriptions. Remember to use connectors.
- Show the stimulus travelling along neurons and reaching the central nervous system.

Then, ...

Next, ...

Afterwards, ...

Finally, ...

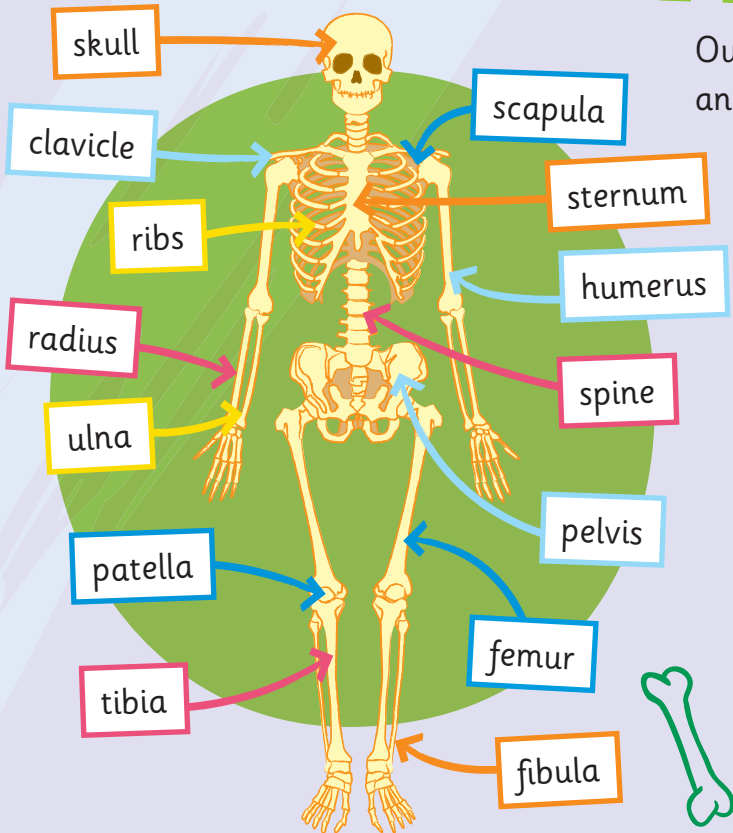
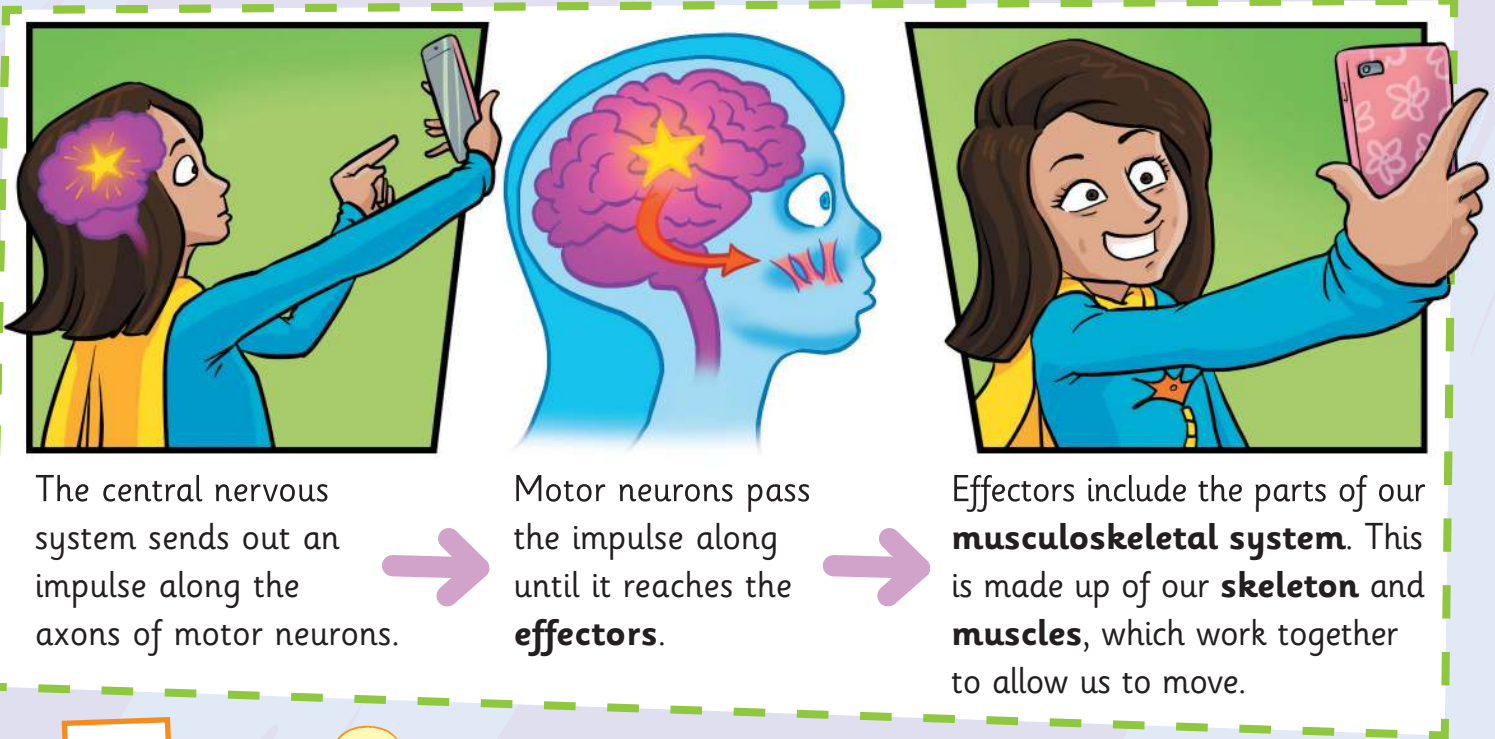


HOW DO GYMNASTS BEND BACKWARDS?



Discover...
the parts of the musculoskeletal system.

When our central nervous system receives a stimulus, it tells our body how to **respond** by sending a message to a specific part.



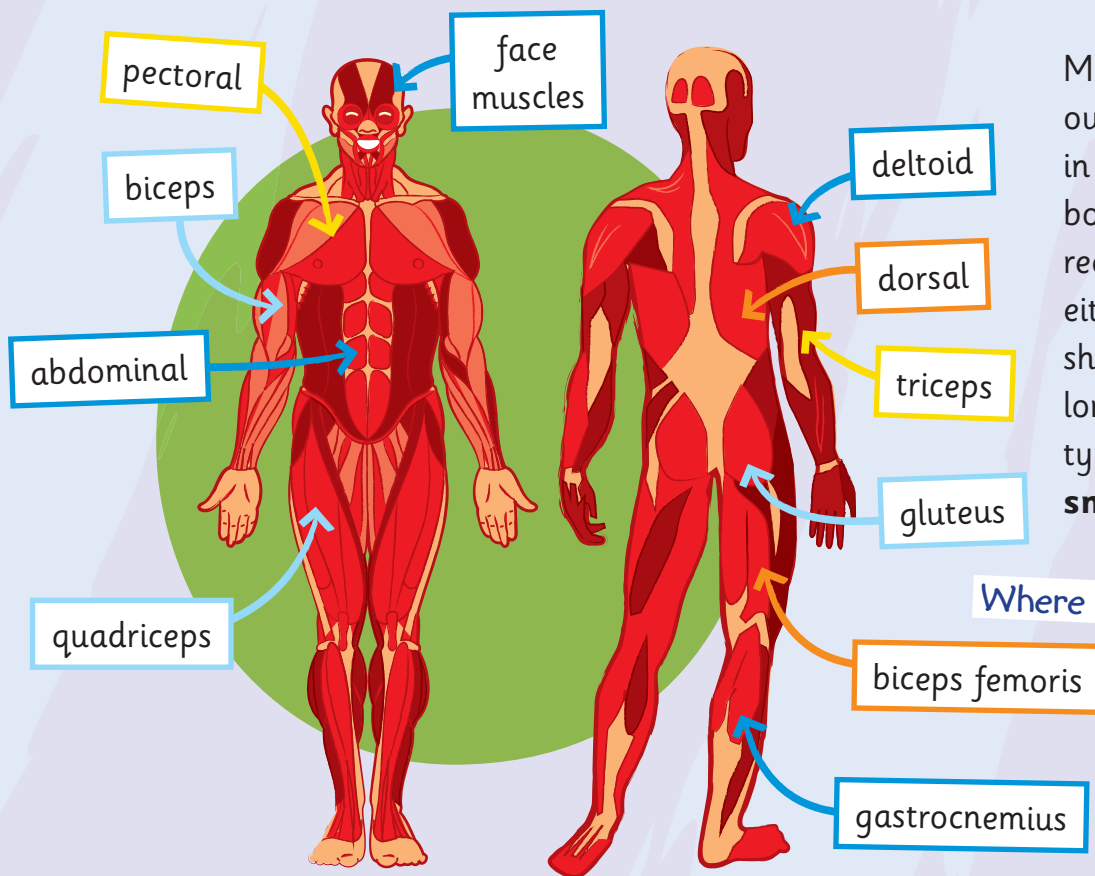
Our skeleton supports our body and protects our inner organs.

What are bones made of?
Do they have another function?

A **joint** is where two bones are connected. There are three types:
Fixed, like the parts of the skull.
Semi-flexible, like in the spine.
Flexible, like in the knee.

Which joints allow a gymnast to do this?





Many of the muscles in our body work together in groups to move our bones. When a muscle receives a stimulus, it either **contracts** (gets shorter) or **relaxes** (gets longer). There are three types of muscle: **skeletal**, **smooth** and **cardiac**.

Where do you find each type?

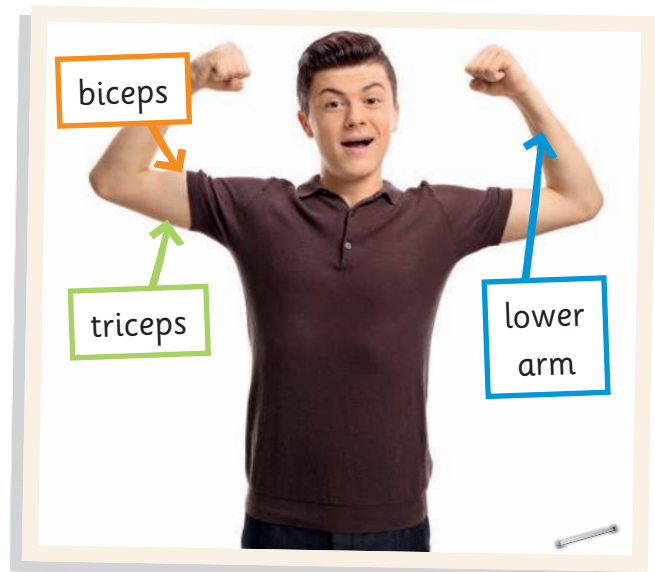
Find out how our skeletal muscles attach to our bones.

Some muscles work in pairs, like the biceps and triceps muscles. When one muscle contracts, the opposite muscle relaxes.

Try it yourself! Describe the changes happening.



What is the fastest muscle in your body?
 If you blink, you might miss it.



Explore

STAGE 3

- Find out which muscles and bones are involved in the response related to your superhero's initial stimulus.
- Discuss with a partner and compare the pathways of your super senses!
- Create some scenes to show the pathway and the response. Include pictures and written descriptions.

My pathway includes the ...

It travels along the motor neurons in the ... to the ...

WHAT HAPPENS WHEN YOU TOUCH SOMETHING HOT?

Most of the actions involving our **skeletal muscles** are **voluntary**.

Our nervous system controls necessary functions that keep us alive, like breathing and heart rate, without us thinking. These are **involuntary** actions carried out by **smooth** and **cardiac muscles**.

Sometimes a very quick response to a stimulus is needed. This is called a **reflex** and it happens without us having to think.



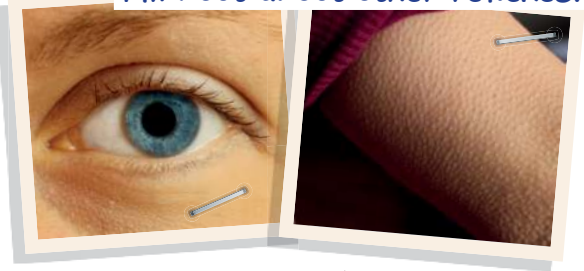
Discover...
how reflexes work and keep us safe.



→ Why are reflexes important?

In reflexes, a **sensory neuron** carries a message from a receptor to the **spinal cord**. A **motor neuron** carries the response message back to an effector. The brain is not involved. This is called a **reflex arc**.

Find out about other reflexes!



Explore

STAGE 3

- Imagine you no longer have one of your senses. What would your life be like?
- Find out about people who live without your superhero's sense. Discuss with a partner.
- To add drama to your comic, your superhero could lose their super sense. What happens? Include scenes to show this and add a paragraph to explain.

Look back

Is it quicker for an impulse to reach the brain or the spinal cord? Why is this important for reflexes?

People who cannot ... are ...

They manage without ... by ...

WHY DOES A TENNIS PLAYER MOVE WHILE WAITING FOR A SERVE?

Background: When the knee is tapped, the patellar reflex makes the lower leg move. But sometimes the brain can get in the way of a reflex, changing the reaction.

Hypothesis: When your brain is activated, will your response to the stimulus be more, less, or the same?

Materials: table or desk, your hand



Step 1: Ask your partner to sit so their legs hang freely. Find the soft indent below the patella on one of your partner's knees. With your palm facing up, gently tap them in this spot with the side of your hand.

Step 2: In the same position, have your partner lock their fingers together and ask them to try to pull their hands apart. Gently tap their knee again.

Conclusion: How can you explain the difference in the response?

How could this knowledge be useful to athletes?

Find out more...

Discover...

how reflexes can be affected.



Reflect 1

What is the response? Which muscles are responsible?
 Draw a picture.

Reflect 2

What is the response now?
 How does it compare to the response in Step 1?

When our brain is activated, our reflexes are ...



Athletes should ... to react ... to a stimulus.